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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/706,097	11/12/2003	Ci-Ling Pan	59629-8012.US01	6504

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EXAMINER	
NGUYEN, HOAN C	

ART UNIT	PAPER NUMBER
2871	

DATE MAILED: 12/12/2005

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)
	10/706,097	PAN ET AL.
	Examiner	Art Unit
	HOAN C. NGUYEN	2871

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-14* is/are pending in the application.

4a) Of the above claim(s) *4-7 and 9* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-3,8 and 10-14* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☒ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

Applicant's election with traverse of Group I (claims 1-3 and 8) in Paper on 11/17/2005 is acknowledged.

Applicant's arguments regarding the restriction requirement have been considered; however, the traversal was on the grounds that there is no serious burden on the Examiner in examining all of claims 1-14 together. This is not found persuasive since the different types of magnets and the different magnetic strengths will generate the different searches.

Therefore, the requirement is deemed proper and is considered to be final.

Applicant added new claims 10-14, wherein the new independent claim 10 has the same scope of the invention with claim 1. Therefore, claims 10-14 are considered in this action.

Claims 4-7 and 9 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected inventions and species, there being no allowable generic or linking claim. Therefore, ONLY claims 1-3, 8 and 10-14 are pending in the elected Species.

Specification

The disclosure is objected to because of the following informalities:

- Abstract has error typo: "1THz=10^{12}Hz", not "1THz=10^{-12}Hz" as cited.
- Examiner requests to further explain the phase delay δ in the formula 2:

  If θ=0.0, then $\delta(0) \approx (1/n_o) - n_o$;

  If $\theta=\pi/2$, then $\delta(\pi/2) \approx (1/n_e) - n_o$;

Is this is correct for the phase delay δ value? Please provide the explanation if this δ value is still correct.

Appropriate correction is required.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

1. Claims 1-3, and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim et al. (US5184233A) in view of Lim et al. (Appl. Phys. Lett. 62 (10), 8 March 1993).

Regard to claim 1, 10-13, Lim et al. (US5184233A) disclose a phase shifter based on magnetically controlled birefringence in liquid crystal, the phase shifter comprising:

- a magnetic field generating mechanism with adjustable direction (col. 6 line 64 to col. 7 line 2), the magnet can be rotated around an axis to provide a magnetic field of adjustable direction, thus change the orientation of the liquid crystal molecules in a liquid crystal cell;
- a liquid crystal cell through which the wave propagates, the corresponding reflective refraction index of the liquid crystal will be changed according to the angle of the magnetic field, the equivalent optical path of the wave is also changed, thus providing a continuously adjustable phase shift;

wherein

Claims 2-3 and 12-13:

- said direction-adjustable magnetic field mechanism further comprising other shapes and configuration of permanent magnets capable generating adjustable magnitude and direction of said magnetic field.

However, Lim et al. (US5184233A) fails to disclose the liquid crystal cell through which the THz wave propagates.

Lim et al. (Appl. Phys. Lett. 62 (10), 8 March 1993) disclose the liquid crystal cell through which the THz (or millimeter) wave propagates.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a the phase shifter as

Lim et al. (US5184233A) disclosed with the liquid crystal cell through which the THz (or millimeter) wave propagates for commercial and application purposes.

2. Claims 1-3, 8, and 10-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lim et al. (US5184233A) in view of Masaki Tanaka et al. (Japanese Journal of Applied Physics, Part 1, Vol. 39, , Number 11, pp. 6393-6396.).

Regard to claim 1, 10-13, Lim et al. (US5184233A) disclose a phase shifter based on magnetically controlled birefringence in liquid crystal, the phase shifter comprising:

- a magnetic field generating mechanism with adjustable direction (col. 6 line 64 to col. 7 line 2), the magnet can be rotated around an axis to provide a magnetic field of adjustable direction, thus change the orientation of the liquid crystal molecules in a liquid crystal cell;
- a liquid crystal cell through which the wave propagates, the corresponding reflective refraction index of the liquid crystal will be changed according to the angle of the magnetic field, the equivalent optical path of the wave is also changed, thus providing a continuously adjustable phase shift;

wherein

Claims 2-3 and 12-13:

- said direction-adjustable magnetic field mechanism further comprising other shapes and configuration of permanent magnets capable generating adjustable magnitude and direction of said magnetic field.

However, Lim et al. (US5184233A) fails to disclose the liquid crystal cell through which the THz wave propagates (claims 1 and 10) and said comprising the alignment of the liquid crystal molecules which are parallel to the substrate (claims 8 and 14).

Masaki Tanaka et al. disclose the liquid crystal cell through which the THz (or millimeter) wave propagates and comprising the alignment of the liquid crystal molecules which are parallel to the substrate (Figs. 3 and 6 describe the transmission properties of LC cells with rubbing direction parallel to E_{MMW}, which is parallel to substrates Fig. 5a).

Therefore, it would have been obvious to one having ordinary skill in the art at the time the invention was made to further modify a the phase shifter as Lim et al. (US5184233A) disclosed with (a) the liquid crystal cell through which the THz (or millimeter) wave propagates for commercial and application purposes such as small size, low cost, low lost and low power consumption: and (b) the liquid crystal cell comprising the alignment of the liquid crystal molecules which are parallel to the substrate for typical weak dispersive effect in the MMW region as Masaki Tanaka et al. taught.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure:

Wang et al. (US 20040010196A1) disclose a Fresnel lens tomographic imaging including a radiation source, where the radiation source comprises a white light source, the tunable filter may comprise an electrically tunable filter such as a liquid crystal tunable filter, an acoustic-optical tunable filter, or an interferometer or spectrometer, such as a Fabry-Perot Etalon.

McMakin et al. (US 20030128150 A1) disclose Interrogation of an object for dimensional and topographical information including transceiver 42 and elements 38 of array 36 being of a form suitable to transmit and/or receive electromagnetic radiation selected from the range of about one Gigahertz to about one Terahertz (about 1 GHz to about 1 THz), which corresponds to a free space electromagnetic radiation wavelength range of about 0.3 meter (m) to about 300 micrometers.

Keys et al. (US 20030035610 A1) disclose Phase modulator with terahertz optical bandwidth formed by multi-layered dielectric stack. Liquid crystal implementations have switching times that are on the order of milliseconds and are much slower than the bandpass modulation.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to HOAN C. NGUYEN whose telephone number is (571) 272-2296. The examiner can normally be reached on MONDAY-THURSDAY:8:00AM-4:30PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim H. Robert can be reached on (571) 272-2293. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

HOAN C. NGUYEN
Examiner
Art Unit 2871

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ANDREW SCHECHTER
PRIMARY EXAMINER